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Small-scale turbulence in the quasi-parallel magnetosheath : on the nature of kinetic-scale fluctuations

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Turbulence is ubiquitous in astrophysical plasmas such as accretion disks, interstellar medium and near-Earth space. Thanks to multi-satellite missions, the interest of the space community has recently shifted towards small-scale turbulence as it plays a fundamental role into key processes as energy transport and dissipation for instance. Turbulent behaviour is notably enhanced in the transition regions between the solar wind and Earth's magnetosphere, especially in the quasi-parallel magnetosheath, where most of the classical approximations to study turbulence cannot be applied. Thus the small-scale turbulence remains quite unknown in this region and it is necessary to identify the nature of the kinetic fluctuations (quasi-linear waves, coherent structures...) and their relative importance in the kinetic key processes, to be able to build a global model. To do so, we developed an algorithm that employs Fast Fourier Transform and wavelet analysis (Morlet, Haar) to analyse selected high-quality data from Cluster spacecraft in this region. We also make use of the kinetic solver WHAMP to identify quasi-linear waves from coherent structures. Preliminary results indicate that small-scale fluctuations at ion scales are a mixture of quasi-linear waves and coherent structures.